The Effects of Nonprofessional Caregivers on the Rehospitalization of Elderly Recipients in Home Healthcare

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The purpose of this study is to evaluate the effects of the presence and types of nonprofessional caregivers on the rehospitalization of elderly recipients in home healthcare (HHC). Outcome and Assessment Information Set records of 9832 elderly recipients discharged from hospitals were selected for multivariate analyses. The likelihood of rehospitalization among elderly recipients of HHC did not vary on the basis of the presence and types of nonprofessional caregivers. The findings suggest that when elderly patients are receiving formal HHC services, their risk for rehospitalization is not affected by the presence or the specific types of nonprofessional caregivers. **Key words:** *aged*, *family caregivers*, *home healthcare*, *informal caregivers*, *nonprofessional caregivers*, *rehospitalization*

REDUCING the rehospitalization rates has become one of the most desired goals for home healthcare (HHC) services as well as for hospital care. Specifically, post–acute HHC services are a recognized strategy for preventing rehospitalization. Although patients are provided with adequate medical treatment in hospitals, inadequate follow-up care in post–acute settings may contribute to rehospitalization.[1] Older adults with chronic and multiple medical conditions are especially vulnerable to rehospitalization.[2] The hospital readmission of elderly patients is a significant contributor to high costs of healthcare and accounts for a substantial amount of Medicare expenditures.[3] The prevention of rehospitalization is important for reducing healthcare costs, improving patient recovery, and decreasing family burden.

Research data concerning the relationship between the utilization of HHC and rehospitalization are inconclusive. Research investigating this relationship has focused on the role of formal services, such as prompt follow-up by nurses and skilled nursing care, advanced practice nurses, or other professional services.[1,2,4-6] These studies have not considered the potential effects of nonprofessional caregivers, such as family members, friends, and neighbors on rehospitalization although these nonprofessional caregivers have traditionally been a major source of support for older adults living in the community. It is not clear whether lower rates of rehospitalization occur in patients who receive care from both an HHC agency and nonprofessional

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caregivers. Furthermore, it is not known how differences in rehospitalization rates of older adults relate to the varying types of nonprofessional caregivers. This knowledge gap is glaring considering that nonprofessional caregivers provide approximately 80% of all care at home[7] with an estimated market value of $196 billion a year in the United States.[8]

Until now, research regarding nonprofessional caregivers has focused largely on caregiver experiences such as caregivers' stress and burden[9-11] and effects of formal HHC services or social support on nonprofessional caregivers.[12-14] Some researchers have also examined the effects of nonprofessional caregivers on patients' health.[15-22] Research suggests that support from specific nonprofessional caregivers may have differential effects on mental and physical health. While there has been some research on the effects of nonprofessional caregiver on mental health,[15-20] fewer studies have investigated the relationship between nonprofessional caregiver and physical health.[19-22] Mendes de Leon and colleagues examined the association of nonprofessional caregiver with physical disability. They reported that support from friends reduced the risk for disability, but support from children or other relatives was not related to disability.[21] Contrarily, some studies report that family members serve important support for physical health.[19,20,22] Overall, the literature suggests that support from different sources have differential effects on mental and physical health. However, few researchers have examined the effects of nonprofessional caregivers on patient rehospitalization although rehospitalization is expensive and imposes burdens on patients, families, and society. Thus, the purpose of this study was to examine differences in rehospitalization among HHC patients, with and without nonprofessional caregivers. Furthermore, this study also investigated whether or not the differences in rehospitalization were attributable to the types of nonprofessional caregivers, namely, spouse, offspring, relatives, nonrelatives, or paid helpers.

THEORETICAL BACKGROUND

Two theories, both falling under the broad conceptualization of social network theory, were useful while researching the effects of nonprofessional caregivers on health-related outcomes of elderly recipients. Social network theories propose that social interaction between individuals leads to heterogeneous relationships that have different supportiveness.[23] There are 2 main social network theories: task-specific theory and hierarchical-compensatory theory. According to the task-specific theory, different social networks have different characteristics, and because of these different characteristics, each group can optimally manage different tasks.[24,25] In addition, provision of aid varies across different ties even within the primary groups such as spouses, offspring, relatives, and nonrelatives. For example, spouses typically live together and, therefore, they have personal contacts on a daily basis, and can provide social support over a long period of time. On the other hand, adult children are less likely to live together with their parents; therefore, they have less face-to-face contact and the contact is intermittent. Although neighbors live close by, their contact is less personal and more congenial, and these relationships typically do not provide long-term commitments.[25]

Hierarchical-compensatory theory emphasizes the importance of care recipients' preferences. According to this theory, older adults seeking help have an ordered preference on the basis of "the primacy of the relationship between the caregiver and elderly recipient."[25(p123)] Specifically, older adults prefer the assistance of spouses; when they are not available, they turn first to children, second to other relatives, then to friends or neighbors, and last to formal groups.[25-27] Therefore, the social network can be categorized in a hierarchical-compensatory manner.

Based on these social network theories, this study hypothesized that the likelihood of rehospitalization will be *lower* in (1) HHC patients with a nonprofessional caregiver than

those without a nonprofessional caregiver; (2) those with a nonpaid caregiver than those with a paid helper; and (3) those with a spouse caregiver than those with an offspring, relative, or nonrelative caregiver.

METHODS

Data source

This study was a secondary data analysis of a computerized patient care database, the Outcome and Assessment Information Set (OASIS) collected by a large Medicare-Medicaid–certified home healthcare agency in New York City. The Centers for Medicare and Medicaid Services have required all Medicare-certified HHC agencies to collect the OASIS data for all adult nonmaternity patients since June 19, 1999.[28] The OASIS data include all older adult patients receiving HHC services from a Medicare-certified HHC agency regardless of the types of health insurance. OASIS contains detailed data that enable evaluation of patient outcomes.

HHC agencies collect patient data with OASIS at regular intervals, that is, at the start of care, every 60 days after start of care, and at discharge from HHC agencies. HHC agencies reassess patients every 60 days because Medicare reimburses HHC a fixed payment for a 60-day episode of service. Admission to an inpatient facility during the time in which patients are receiving HHC is a significant event that must be considered in determining HHC outcomes. Therefore, in addition to the regular intervals for assessment, the transfer of a patient to an inpatient facility for a period of at least 24 hours for any reason other than diagnostic testing requires the completion of a transfer version of the assessment.

The OASIS data collection is generally conducted by a registered nurse except in circumstances when therapy services alone are required for the patient. For a therapy-only case, the primary therapist conducts the comprehensive assessment. In cases involving multiple disciplines, the registered nurse completes the assessment. The OASIS data are collected through a combination of methods, including interviews with patient/caregiver, observations, and measurements. Direct observation is the preferred method for data collection, but some historical data may also be obtained by interview. In all cases, the patient is the preferred source for interview data, although the caregiver can provide information if the patient is unable to do so.[28]

Interrater reliability of OASIS items using independent assessments by 2 clinicians have been reported by the Center for Health Services Research at the University of Colorado that developed OASIS.[29] On the basis of a commonly used guideline for interpreting values of kappa,[30] researchers have considered substantial interrater reliability as kappa scores of greater than 0.60.[29-34] Most items used in the present study have substantial interrater reliability with kappa scores ranging from 0.63 to 1.0. However, 3 covariates, depressive symptoms ($\kappa = 0.54$), frequency of care ($\kappa = 0.52$), and types of care ($\kappa = 0.40$), do not have adequate reliability.[29]

Megidan and Fortinsky also examined the psychometric properties of functional dependence and depressive symptoms that were used for the present study.[35] They concluded that functional dependence items are sufficiently reliable based on interrater reliability (mean $\kappa = 0.81$),[34] intrarater reliability (mean $\kappa = 0.65$), and internal consistency ($\alpha = .86$).[35] There is also an evidence for construct validity for the functional domain with factor loadings greater than 0.61 and 56.3% of the variance explained.[35] Depressive symptoms are also sufficiently reliable on the basis of intrarater reliability ($\kappa = 1$) but the factor analysis for construct validity was problematic ranging from less than 0.10 to 0.70 and 21.6% and 5.5% of the variance explained.[35]

Study sample

All patients who met the following criteria were included in this study: (1) patients aged 65 and more, (2) patients enrolled to a home healthcare agency from acute care hospitals, and (3) patients enrolled to the home

healthcare agency between January 1, 2002, and June 30, 2002. The total sample for this study was 9832 older adults.

Measurements
Rehospitalization

The outcome variable was rehospitalization. *Rehospitalization* was defined as the admission to a hospital within 60 days after patients were enrolled to the HHC agency. All HHC patients who were ever hospitalized for a 60-day episode of formal HHC were coded as being hospitalized. Thus, rehospitalization was coded as a dichotomous variable with a value of 1 if patients receiving formal HHC services were rehospitalized, and a value of 0 if they were not rehospitalized. A 60-day time window was used for rehospitalization because current Medicare policy reimburses HHC for only 60-day episodes. Furthermore, according to the literature, most patients who received HHC were rehospitalized after approximately 2 weeks of HHC services[36] or within 26 days after hospital discharge.[4] Thus, the 60-day time window is sufficient to investigate the likelihood of rehospitalization for HHC patients.

Presence and types of nonprofessional caregivers

The presence and types of nonprofessional caregivers were the predictor variables of primary interest in this study. For the purpose of this study, nonprofessional caregivers were defined as nonpaid or paid persons who "take lead responsibility for providing or managing the patient's care, providing most frequent assistance."[28(p853)] OASIS classifies nonprofessional caregivers as spouse or significant other, daughter or son, other family member, nonrelative caregiver (friend, neighbor, community, or church member), and paid helper (other than HHC agency staff). Thus, the present study followed the categorization of OASIS for the types of nonprofessional caregivers. The presence of nonprofessional caregiver was defined as having any nonpro-

fessional caregiver. Thus, in this study, caregiver arrangements were categorized as the presence and types of nonprofessional caregivers: (0) no caregiver, (1) spouse or significant other, (2) daughter or son, (3) other family member, (4) nonrelative caregiver (friend, neighbor, community, or church member), and (5) paid helper (other than HHC agency staff).

Covariates

Covariates included in data analysis models were those found to be associated with patient outcomes in previous studies.[37-42] To control for these factors, the covariates were included in data analysis models as independent variables. The covariates included age, gender, race, Medicaid beneficiary or not, the number of diseases, severity of illness, baseline cognitive function, baseline depressive symptoms, primary diagnosis, baseline functional dependence, length of time enrolled in formal HHC, living arrangements, frequency of care from nonprofessional caregivers, and types of care from nonprofessional caregivers (Table 1).

Data analysis

The first phase of the analysis described baseline characteristics of the entire study population ($N = 9832$). Furthermore, bivariate (chi-square test) and multivariate analyses (logistic regression) were conducted to examine the relationship between caregiver arrangements and rehospitalization. Logistic regression analyses were employed to analyze the effects of caregiver arrangements on rehospitalization while controlling for a set of covariates.

The first logistic regression model examined the likelihood of rehospitalization among HHC patients, with and without nonprofessional caregivers. Thus, in the first logistic regression, the caregiver arrangement was coded as a dummy variable (with a caregiver vs no caregiver). The second regression model compared patients having a paid

Table 1. Sample characteristics

Variables	Coding	Total (N = 9832)
Age, *M* (SD), y	Continuous variable	78.8 (8.17)
Gender, *N* (%)	Dummy variable	
Male		3385 (34.4%)
Female		6447 (65.6%)
Race, *N* (%)	Categorical variable	
Black		2172 (22.1%)
White		5192 (52.8%)
Hispanic		1979 (20.1%)
Asian		364 (3.7%)
Others		125 (1.3%)
Medicaid, *N* (%)	Dummy variable	
Yes		2446 (24.9%)
No		7386 (75.1%)
Number of diseases,[a] *N* (%)	Continuous variable	
1		451 (4.6%)
2		1436 (14.6%)
3		2483 (25.3%)
4		2671 (27.2%)
5		2791 (28.4%)
Severity of illness, *N* (%)	Categorical variable	
0 = Asymptomatic, no treatment needed at this time		0 (0%)
1 = Symptoms well controlled with current therapy		573 (5.8%)
2 = Symptoms controlled with difficulty, affecting daily functioning; patient needs ongoing monitoring		5659 (57.6%)
3 = Symptoms poorly controlled, patient needs frequent adjustment in treatment and dose monitoring		2781 (28.3%)
4 = Symptoms poorly controlled, history of rehospitalization		819 (8.3%)
Cognitive function, *N* (%)	Categorical variable	
Alert (no cognitive impairment)		6789 (69.1%)
Mild impairment (require prompting, such as cuing, repetition, reminders, only under stressful or unfamiliar conditions)		1995 (20.3%)
Severe impairment (consistently require low stimulus environment due to distractibility, or require considerable assistance in routine situations, or totally dependent due to disturbances)		1048 (10.7%)
Depressive symptoms, *N* (%)	Categorical variable	Missing *n* = 2
None		8104 (82.4%)
Mild (depressed mood or sense of failure/self-reproach)		1494 (15.2%)
Severe (hopelessness, recurrent thoughts of death, and thought of suicide)		232 (2.4%)
Primary diagnosis	Categorical variable	
Neoplasms		1099 (11.3%)
Endochrine/nutritional/metabolic		684 (7.0%)
Nervous system diseases		186 (1.9%)
Circulatory system diseases		3352 (34.4%)
Respiratory system diseases		926 (9.5%)
Digestive system diseases		475 (4.9%)
		(continues)

Table 1. Sample characteristics (*Continued*)

Variables	Coding	Total (*N* = 9832)
Genitourinary system diseases		243 (2.5%)
Skin		452 (4.6%)
Musculoskeletal system diseases		769 (7.9%)
Injury or poisoning		822 (8.4%)
Others		723 (7.4%)
Functional dependence (ADL + IADL),[b] *M* (SD)	Continuous variable	42.0 (18.60)
Length of time in formal HHC (no. of days), *M* (SD)	Continuous variable	39.1 (21.75)
Rehospitalization	Dummy variable	
Yes		1820 (18.5%)
No		8012 (81.5%)
Caregiver arrangements, *N* (%)	Dummy variable in model 1,[c] dummy variable in model 2,[d] categorical variable in model 3[e]	
None		1600 (16%)
Spouse		2417 (25%)
Offspring		3740 (38%)
Relative		1009 (10%)
Nonrelative		363 (4%)
Paid helper		703 (7%)
Living arrangements,[f] *N* (%)	Categorical variable	Missing *n* = 3
Caregiver lives outside home		3172 (38.5%)
Caregiver lives in home		4433 (53.9%)
Caregiver is a paid helper living outside home		624 (7.6%)
Frequency of care from a nonprofessional caregiver,[f] *N* (%)	Categorical variable	Missing *n* = 79
1 = Several times during day and night		4024 (49.4%)
2 = Several times during a day		1591 (19.5%)
3 = Once daily		738 (9.1%)
4 = Three or more times per week		754 (9.2%)
5 = One to 2 times per week		1046 (12.8%)
Types of care from a nonprofessional caregiver,[f] *N* (%)		Missing *n* = 3
ADL assistance (Yes)	Dummy variable	3782 (38.5%)
IADL assistance (Yes)	Dummy variable	6258 (63.6%)
Psychosocial support (Yes)	Dummy variable	6854 (69.7%)
Other types of support (Yes)	Dummy variable	7445 (75.7%)

[a] Including primary diagnosis.
[b] Activities of daily living (ADLs) include grooming, dress upper-body, dress lower-body, bathing, toileting, transferring, ambulation/locomotion, feeding, or eating, and instrumental activities of daily living (IADLs) include preparing meal, transportation, laundry, housekeeping, shopping, and using telephone (0 is no dependence and 100 is complete dependence).
[c] Dummy variable in logistic regression model 1: with a caregiver (including spouse, offspring, relative, nonrelative, paid helper) vs no caregiver.
[d] Dummy variable in logistic regression model 2: nonpaid caregiver (including spouse, offspring, relative, nonrelative caregivers) vs paid helper.
[e] Categorical variable in logistic regression model 3: spouse (reference), offspring, relative, and nonrelative.
[f] Within patients who have a nonprofessional caregiver (*N* = 8232).

helper with those having a nonpaid caregiver such as spouse, offspring, relative, or nonrelative caregiver. The caregiver arrangement was coded as a dummy variable (nonpaid caregiver vs paid helper). The third regression model compared patients cared by a spouse caregiver with each of those with an offspring, relative, and nonrelative caregiver. The caregiver arrangement was entered as a categorical variable that is categorized as spouse, offspring, relative, and nonrelative. The spouse caregiver group was the reference group.

Each logistic regression model had the same demographic variables, health-related variables, and caregiver-related variables (living arrangements, frequency of care from a nonprofessional caregiver, and types of care from a nonprofessional caregiver). However, the caregiver-related variables were not used when the logistic regression model compared patients having no caregiver with those having any caregiver. The $\alpha = .05$ was the level used for statistical significance.

RESULTS

Sample characteristics

The baseline characteristics of the study population ($N = 9832$) were demonstrated in Table 1. The average age of patients was 78.8 years. The majority of patients were female (65.6%), white (52.8%), and non-Medicaid beneficiaries (75.1%). In terms of health-related variables, the majority of patients (80.9%) had 3 or more diseases, which include both primary diagnosis and comorbid conditions. The majority of patients (94.2%) had symptoms, which were not well controlled with current therapy. The majority of patients showed no cognitive impairment (69.1%) and no depressive symptoms (82.4%) at the time of the HHC enrollment assessment. The average of baseline functional status was 42 (0 is no dependence and 100 is complete dependence).

In terms of care received at home, the average length of time enrolled in formal

HHC was 39.1 days. For a 60-day episode of formal HHC, 1820 patients (18.5%) were rehospitalized.

The majority of patients had nonprofessional caregivers (84%), which were distributed among spouse caregivers (25%), offspring caregivers (38%), relative caregivers (10%), nonrelative caregivers (4%), and paid helpers (7%). The majority of patients (53.9%) lived with their caregivers. Many patients (49.4%) received care from their nonprofessional caregivers several times during the day and night. The types of care received from nonprofessional caregivers were activities of daily living assistance (38.5%), instrumental activities of daily living assistance (63.6%), psychosocial support (69.7%), and other types of care (75.7%).

Relationship between caregiver arrangements and rehospitalization

Chi-square analysis did not show any significant difference in the rehospitalizations across the 6 caregiver arrangements that are spouse caregiver, offspring caregiver, relative caregiver, nonrelative caregiver, paid helper, and no caregiver ($\chi^2 = 5.21$, $P = .39$). However, this result may be due to risk variables that differ across groups. Therefore, to investigate the true relationship between caregiver arrangements and rehospitalization, 3 logistic regression models were conducted.

Three fully adjusted logistic regression models were depicted in Table 2. The first logistic regression model shows that the presence or absence of any nonprofessional caregiver was not significantly associated with rehospitalization rate ($P = .56$). The second logistic regression model presents that for those patients who had a nonprofessional caregiver, payment status of caregivers (nonpaid caregiver vs paid helper) was not associated with the risk of rehospitalization ($P = .98$). Finally, the third logistic regression model indicates that among patients with nonpaid caregivers, there were no significant differences in the risk of rehospitalization between patients with a spouse caregiver

Table 2. Logistic regression estimates for the difference in rehospitalization across caregiver arrangements[a]

Caregiver arrangements	Odds ratio (95% CI)	*P*
Model 1: Having a caregiver vs no caregiver ($N = 9832$)		
Having a caregiver	0.96 (0.83–1.11)	.56
No caregiver	Reference	
Model 2: Nonpaid caregiver vs paid helper ($N = 8232$)		
Nonpaid caregiver	1 (0.76–1.31)	.98
Paid helper	Reference	
Model 3: Spouse vs other Nonpaid caregivers ($N = 7529$)		
Offspring	1.06 (0.90–1.26)	.49
Relative	0.99 (0.79–1.25)	.95
Nonrelative	1.28 (0.93–1.77)	.13
Spouse	Reference	

[a]Models controlled for age, gender, race, Medicaid beneficiary or not, the number of diseases, severity of illness, baseline cognitive function, baseline depressive symptoms, primary diagnosis, baseline functional dependence, length of time enrolled in formal HHC. Models 2 and 3 also controlled for living arrangements, frequency of care from nonprofessional caregivers, and types of care from nonprofessional caregivers.

and those with an offspring or other relative caregiver ($P = .49$ and $P = .95$, respectively). However, there was a trend toward increased rehospitalization risk (OR = 1.28) at a marginal significance level of $P = .13$ when nonrelative rather than spouse provided care.

DISCUSSION

Relationship between caregiver arrangements and rehospitalization

The findings from this study showed that the rehospitalization rates among elderly recipients of HHC did not vary on the basis of the presence and types of nonprofessional caregivers. These results are consistent with the study conducted by Van Houtven.[43] The researcher studied whether or not informal care of elderly parents by their children reduces formal care use, such as HHC, nursing home care, hospitalization, outpatient surgery, and doctor's visits.[43] The researcher found that older adults who received informal care were 72% less likely to use HHC and 89% less likely to use nursing home care in the following 3 years than those who did not receive informal care. However, the nonprofessional caregivers did not affect the hospitalization significantly. On the other hand, the results from the present study are contrary to those of Williams and Fitton, who compared the characteristics of rehospitalized patients with a matched control sample of patients who were not rehospitalized.[44] They reported that problems of nonprofessional caregivers are a principal reason of patients' rehospitalization. However, these studies did not measure whether formal HHC had been provided for these patients.

All patients in this study received formal HHC. If formal HHC is effective in preventing unnecessary rehospitalization, it may be that the presence or types of nonprofessional caregivers may not influence rehospitalization any further. In addition, rehospitalization is more likely to be determined by healthcare providers rather than by patients or their nonprofessional caregivers. Thus, this study might not find significant difference in the likelihood of rehospitalization across various caregiver arrangements.

Generalizability

Comparing the study population with national patient profiles or the population of

Medicare home healthcare recipients allows one to assess whether the findings from this study are generalizable to the broader population receiving HHC. These comparisons, however, are limited by differences between the study sample and these other groups, as well as by the data available on them. For instance, while the Medicare home care population compares a similar age group, it also includes about 6.5% disabled patients younger than 65 years.[45] Other features are similar between the study sample and the national Medicare HHC population. The majority of subjects in both groups are females, and the distribution of cases by primary diagnosis is similar, with 34.4% of subjects in the present study having conditions related to disease of the circulatory system as their primary diagnosis, and 33.5% of Medicare HHC patients also sharing this primary diagnosis.[45] About 54% of subjects in the present study lived with their caregiver, and 60% of Medicare home health users lived with others, although these were not necessarily caregivers.[45]

However, the study sample differed from national patient profiles in a few ways. For example, this study population had more black and Hispanic patients than the national profile of the home care population.[46] The national profile also did not provide the percentage of other groups such as Asians. The present study may well include more Asians, as well as more black and Hispanic patients, because this study used the data from metropolitan New York City. The racial/ethnic population of New York City is much higher than national population.

STUDY LIMITATIONS

Although this study did not find significant differences in the likelihood of rehospitalization across various caregiver arrangements, the relationship between rehospitalization and caregiver arrangements needs to be investigated further because in this study there are some limitations. First, in the OASIS data set, caregiver arrangements are measured only by primary caregivers, which may not capture the complexity of the caregiver networks of older adults. Thus, the estimation of the effects of informal HHC on patient outcomes by only primary caregivers without considering other caregivers may have limitations. Second, the analyses were unable to distinguish between planned and unplanned rehospitalization. The likelihood of planned rehospitalizations may not be different across caregiver groups; thus, including planned rehospitalizations in this study may have contributed to the lack of differences in rehospitalization. Third, the control variables used in this study were limited to those in the data set and may have excluded potential confounders. Furthermore, validity and reliability of some control variables were uncertain. The validity for cognitive function of OASIS has not been evaluated in empirical research, and the OASIS items for the frequency and types of care were found to have inadequate reliability.[29] The evaluation of reliability for depressive symptoms is controversial[29,35] and the validity for depressive symptoms is problematic.[35] Thus, depressive symptoms, cognitive function, and frequency and types of care may not be measured accurately in OASIS. Consequently, they may not have been adequately controlled for in the present study. Nevertheless, this study is the first to examine the effects of each type of nonprofessional caregivers (spouse, offspring, relative, nonrelatives, and paid helper) as well as presence of nonprofessional caregivers on the likelihood of rehospitalization of older adults receiving formal HHC.

IMPLICATIONS AND CONCLUSIONS

Despite the limitations noted above, this study has several important implications for nursing research, practice, and policy for older adults and their caregivers. Findings from this study contribute to our understanding of the effects of nonprofessional caregivers on the rehospitalization and point the way for further needed research. Future

studies should assess the effects of the presence and types of nonprofessional caregivers on the rehospitalization of patients after they have been discharged from HHC agencies. Benjamin et al[47] found that one third of the patients, after the completion of Medicare HHC benefits, still had needs for skilled nursing care.[47] At this point, patients may completely depend on care provided by nonprofessional caregivers. It is, therefore, plausible that after being discharged from HHC agencies, the differences in patients' outcomes may be due to the presence or types of nonprofessional caregivers.

The findings of this study suggest that nonprofessional caregivers do not improve rehospitalization of older adults receiving HHC. As stated earlier, task-specific theory proposes that each social network can optimally manage different tasks because each group has different characteristics.[24] Therefore, the findings of this study can be interpreted as HHC agency rather than family members, friends, or paid helpers can optimally manage the tasks affecting rehospitalization. On the basis of the theory, it is possible that nonprofessional caregivers influence other outcomes of older adults rather than rehospitalization. Further research is needed to evaluate the effects of nonprofessional caregivers on other outcomes such as functional status and mental health.

Recommendations for future studies also include further psychometric evaluation of the OASIS items. Further research should compare OASIS items with well-established instruments for some problematic domains to ascertain whether the OASIS items are accurate.[35] It might also be useful to replicate this study, using alternate instruments for depressive symptoms, cognitive function, and frequency and types of care from nonprofessional caregivers, which may verify the findings from this study.

Various studies suggest that having no family caregiver increases the likelihood of nursing home admission after hospital discharge.[48,49] However, the present study's findings suggest that if HHC services are provided, patients with no caregivers or with only paid helpers would not have higher rehospitalization rates than patients who have family caregivers or other nonpaid caregivers. Thus, discharge planning and follow-up focusing on formal HHC should be considered for older adults who are discharged from hospitals regardless of presence and types of nonprofessional caregivers. Also, the presence or types of nonprofessional caregivers should not be the criterion for referral to nursing home and home healthcare. Formal HHC services should be considered as an option even for patients who do not have a nonprofessional caregiver or who only have a paid helper rather than sending the patients to nursing homes. When elderly patients are receiving formal HHC services, their risk for rehospitalization is not affected by the presence or the specific types of nonprofessional caregivers.

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